

ModComp  
Family







### The Compatible ModComp Computer Family

Shown left to right are MODCOMP IV with remote control console, MODCOMP II/25 with paper tape reader and cartridge disc mounted in the same cabinet, MODCOMP II/10 and MODCOMP I on the table.

### Cover

The cover photograph shows the control room for the LTV Aerospace Corporation AIRTRANS automatic vehicle system at the new Dallas-Fort Worth Airport. Shown left to right are the vehicle status board, operator's control console, and ModComp computer control system.



# ModComp Makes the Tools

Modular Computer Systems, Inc., or "ModComp" as the marketplace has come to call us, is a real-time computer systems company. We specialize in offering all of the hardware and software tools needed for:

- **Measurement and Control**
- **Communications**
- **Local and Remote Batch Processing**

End users and turn-key system suppliers can select a set of ModComp tools matched to almost any requirement in these application areas. With a complete and compatible set of tools, the user can concentrate on his application and get on-line in minimum time.

## ModComp Tools Include

### ■ A Compatible Family of Computers

- MODCOMP I — A 16-bit computer for dedicated applications
- MODCOMP II — A large 16-bit computer for real-time multiprogramming applications
- MODCOMP II CP — A communications processor capable of throughput rates up to 200K bytes per second
- MODCOMP IV — A 32-bit computer with hardware innovations which reduce context switching time to a new minimum
- Economical Memory — Available in 16K word core or 32K word solid state modules

### ■ Measurement and Control Software

A choice in programming approach:

- Fill in the blanks process control language
- Real-time FORTRAN IV with process control extensions
- Macro Assembler which can be used in-line with FORTRAN

A Choice of Multiprogramming Systems

- MAX I — For multi-task handling in small systems (MODCOMP I and II).
- MAX II/III — For multi-task handling and batch processing in systems having up to 64K words of memory (MODCOMP II and IV).
- MAX IV — For the most demanding combinations of real time, time sharing and batch processing applications (MODCOMP IV).

### ■ Communications Software

MAXCOM — An executive designed expressly for high throughput communications line handling (MODCOMP II and II CP).

Remote Job Entry — 2780, HASP, UT200 and 1004 packages.

### ■ Batch Processing and Time Sharing Software

- A language processor for every type of application — Assemblers, cross assemblers, macro assemblers, FORTRAN IV, BASIC, RPG.
- Disc operating systems to support both small batch processing and large multiprogramming environments — MAX II, MAX III, MAX IV.

### ■ Real-Time Peripherals

ModComp designs and builds equipment which can handle virtually all types of analog inputs, analog outputs, digital inputs and digital outputs.

### ■ Communications Multiplexers and Line Interfaces

A choice of communications multiplexers is available for line concentration, preprocessing and message switching applications. Individual line interfaces are also available to enable ModComp computers to communicate with remote computers and terminals.

### ■ Data Processing Peripherals

A broad range of paper tape, magnetic tape, disc, printer, display and punched card equipment is offered with ModComp computers. And ModComp software supports all peripherals offered.

### ■ Custom Engineering and Programming

ModComp has system engineers and application programmers for developing special interfaces, terminals and programs to expand system capabilities.



# ModComp Has Delivered

ModComp computer systems are now being used in many measurement, control and communication applications. Representative applications of existing installations are listed below.

## Communications

- Preprocessing
- Local and Remote Concentration
- Multi-Computer Data Networks
- Remote Job Entry
- Telemetry System Control
- Order Entry
- On-Line Inquiry
- Remote Data Collection
- Time Sharing Networks

## Laboratory Measurement and Control

- Man-Machine Interaction Studies
- Experimental Apparatus Control
- Growth Environment Control
- Reactor Control
- Mass Spectrometer Control
- Animal Test Data Collection and Data Base Management
- Radio Telescope Control
- Scheduling, Loading and Data Collection from Satellite Computers

## Energy Generation, Control and Monitoring

- Electric Power Generation Control
- Electric Power Demand Control
- Remote Dam Control
- Pipeline Control
- Electric Power Distribution Control

## Industrial Control, Monitoring and Testing

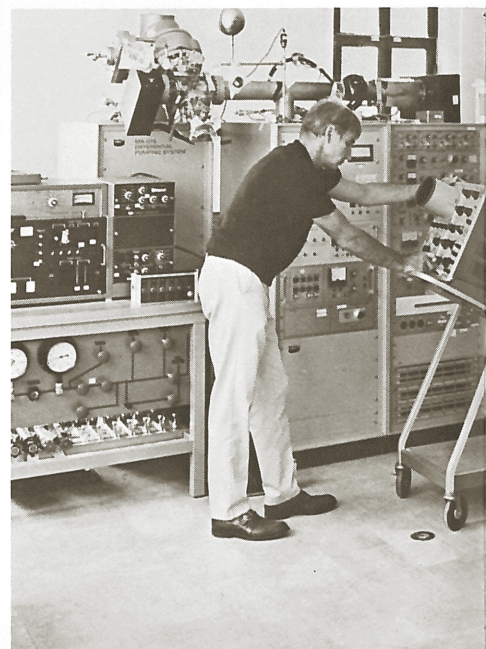
- Process Control — Chemicals, Petrochemicals, Metals
- Loom Monitoring — Textiles
- Furnace Control — Metals
- Manufacturing Parts Testing — Automotive
- Engine Test Stand Control — Aircraft
- Pot Line Control — Aluminum
- Packaging Control and Monitoring — Beverage
- Machine Control — Welding, Milling and Finishing
- Food Processing Control

## Miscellaneous Measurement and Control

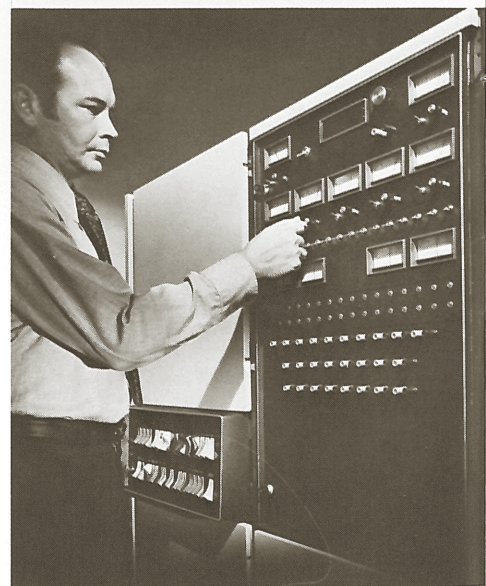
- Building Automation
- City Traffic Control
- Airport Vehicle Control
- Post Office Scheduling and Control
- Coin Collection Monitoring

## Batch Processing

- Space Data Reduction
- Inventory Control
- Medical Waveform Analysis
- Report Generation and Plotting
- University Student FORTRAN Computations
- Seismic Data Reduction
- General Accounting Systems
- Scientific and Engineering Analysis

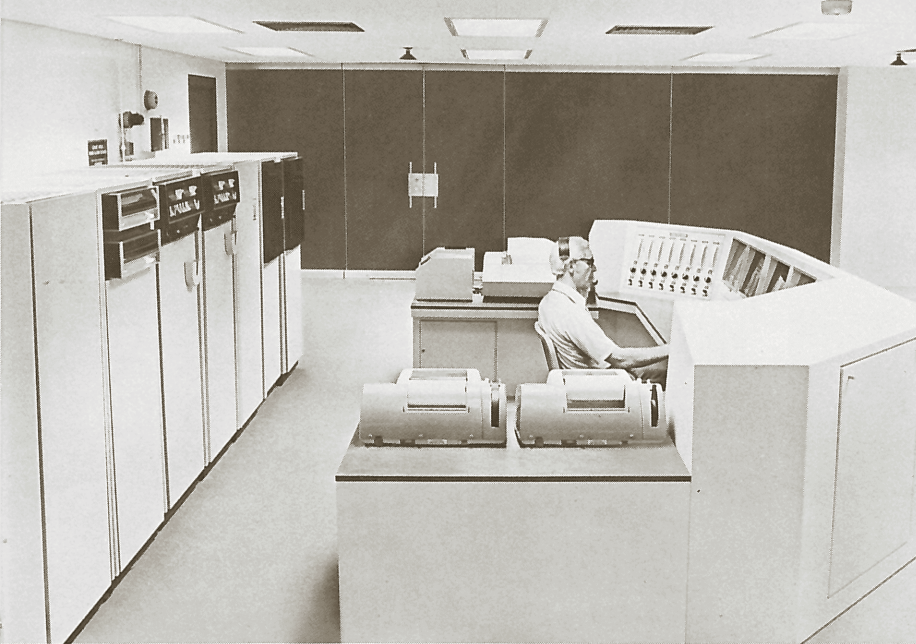


Laboratory Automation



Industrial Process Control





Building Automation



Communications Preprocessing



Engine Testing



Pipeline Control

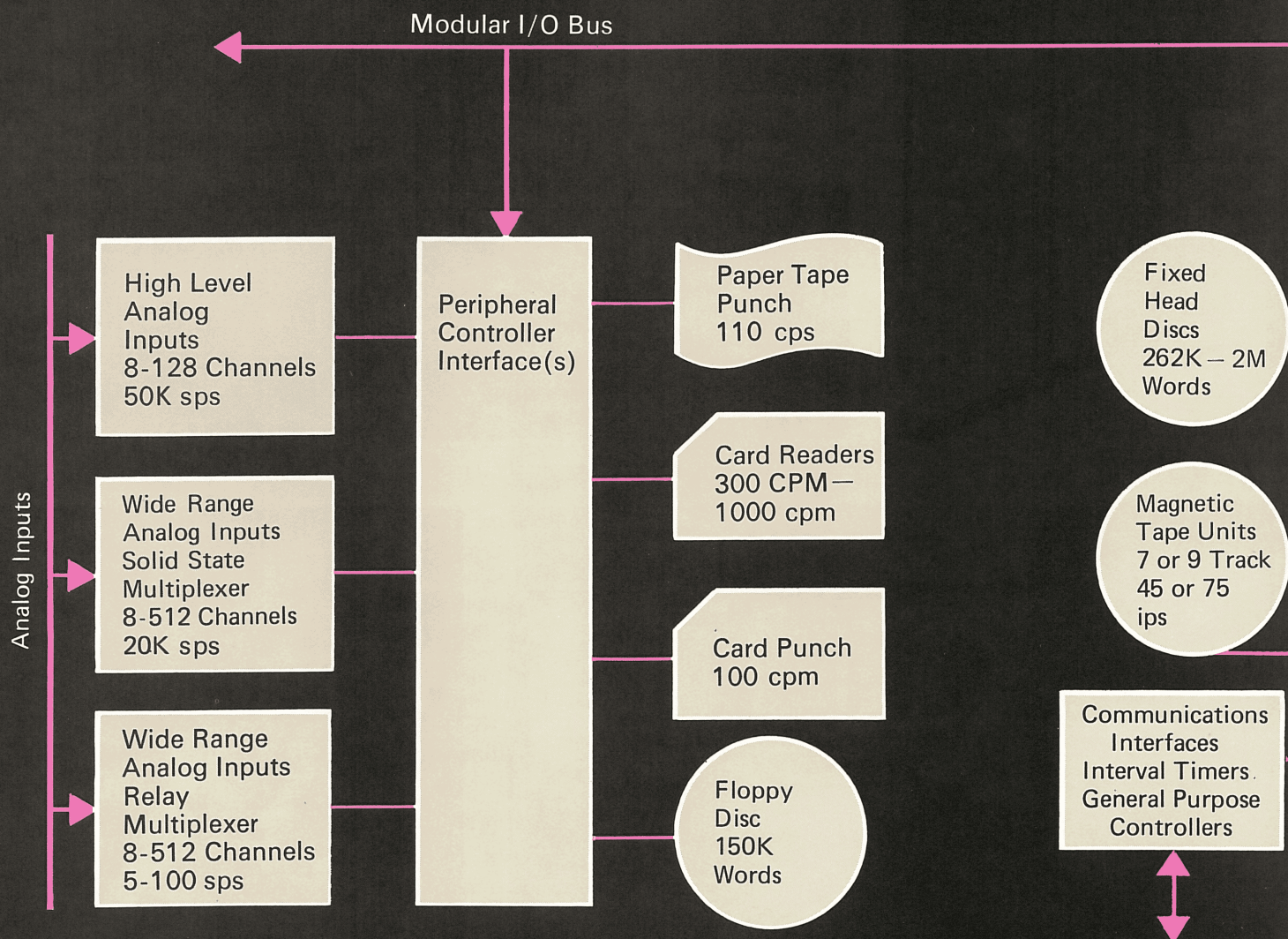
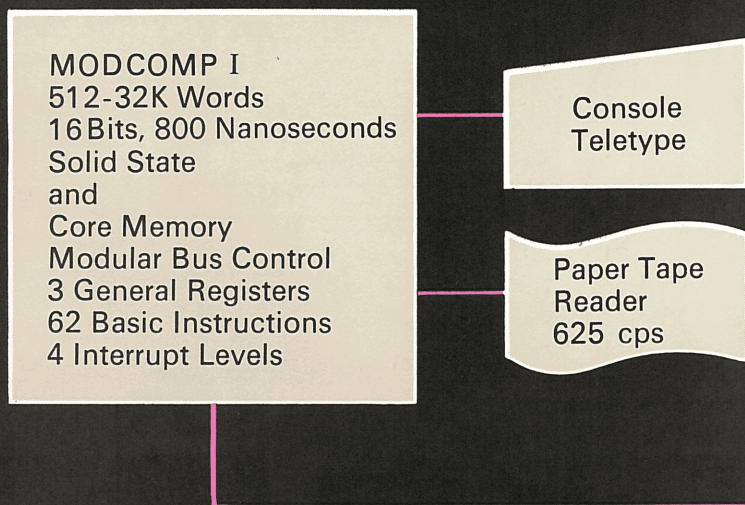


Soil Tillage Research



The overall block diagram at right summarizes the MODCOMP family of compatible system building blocks. The hardware modularity permits MODCOMP systems to remain the most advanced state of the art systems available, because MODCOMP computers and other products have been designed to permit easy up-grading and expansion. At the same time, new MODCOMP systems will remain program and input/output compatible with existing systems.

Therefore an investment in a MODCOMP system provides for the future as well as meeting present requirements. Users can be assured of long term support for their present systems and availability of higher performance but compatible units when they need them.





**MODCOMP II**  
 4-64K Words  
 16 Bits, 800 Nanoseconds  
 15 General Registers  
 Floating Point Hardware  
 Memory Protect  
 Four Port Memory  
 145 Basic Instructions  
 8 Direct Memory Channels  
 16 Interrupt Levels

Console  
 Teletype

Paper Tape  
 Reader  
 625 cps

**MODCOMP IV**  
 16-256K Words  
 32 Bits, 500-800 nanoseconds  
 240 General Registers  
 1,024 Address Mapping  
 Registers  
 64-Bit Floating Point  
 Hardware  
 Push-Pull Hardware  
 Microprogrammed Control  
 Four Port Memory

**MODAC**  
 Analog and  
 Digital I/O  
 Subsystem

Analog

Digital

Peripheral  
 Controller  
 Interface(s)

Moving  
 Head  
 Discs  
 1-26M  
 Words

Line Printers  
 50-150 lpm  
 300 lpm  
 500 lpm  
 600 lpm

Communications  
 Multiplexers  
 Synchronous  
 Asynchronous

Modems

Terminals

Teletypes

Input/  
 Output  
 Interface  
 Subsystem

Contact Inputs & Outputs

Logic Level Inputs & Outputs

Analog Outputs

A-C Outputs

Common Alarm Inputs

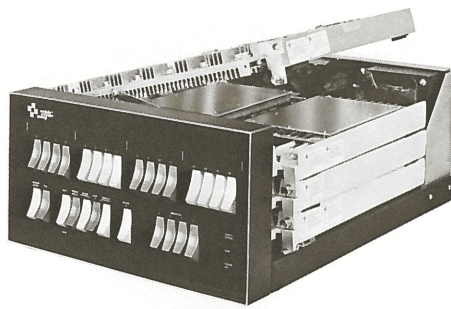
Counter Inputs

Teletypes and Terminals

External Sync



# The ModComp Computer Family



## MODCOMP I

This smallest MODCOMP computer is intended for dedicated data collection, processing and control applications. It offers many standard and optional features:

- 16-Bit Word Length
- 800 Nanosecond Cycle Time
- 2 - 32K Words of Core Memory

- Solid State Random Access Memory
- Solid State Read Only Memory
- Memory Parity
- Power Fail Safe / Auto Start
- Hardware Fill
- Hardware Multiply / Divide
- 8 Direct Memory Channels
- Real Time Clock — 1 msec.
- Optional Programmer's Panel
- 3 General Registers
- 4 Interrupt Levels
- 128 Interrupt Sublevels
- Modular Bus Control—External Control Capability For All Machine Resources
- Optional Internal Modem
- Upward Program Compatibility With MODCOMP II and IV

## MODCOMP IV 32-Bit Computer

This largest ModComp computer is capable of handling the most demanding real-time, time-sharing and batch processing jobs — either individually or concurrently. The MODCOMP IV has all of the bit, byte, and 16-bit word processing capabilities of the smaller ModComp computers plus major hardware extensions in three principal areas:

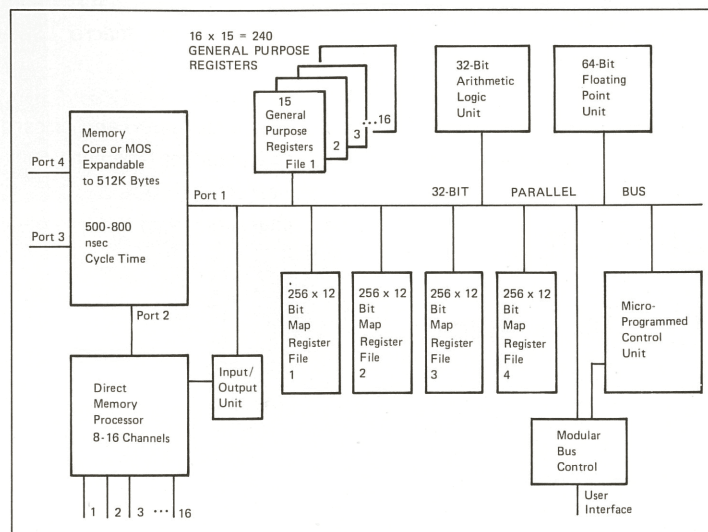
- 32-bit Parallel Processing  
The MODCOMP IV is a 32-bit parallel central processor. The internal busses and adder are 32 bits wide and the floating point unit is 64 bits wide.
- Memory Capacity to 512K Bytes  
Both core and solid state memory modules are available with cycle times from 0.5 to 1.2 microseconds. Four memory mapping files containing a total of 1,024 registers are provided, which enable memory to be allocated in 256 word pages. The fact that

allocated pages need not be contiguous results in more efficient memory utilization and removes the very severe memory partitioning restrictions found in most operating systems.

- Executive Overhead Reduction  
The MAX IV Real Time Operating System has far less overhead than competitive systems due to the hardware features of MODCOMP IV:
- Sixteen sets of general purpose registers which greatly expedite context switching
- Memory allocation/deallocation hardware
- Hardware relocation to decrease program loading overhead and handle roll out/roll in operations
- Hardware push/pull for efficient code re-entrance and stack processing



The MODCOMP IV can contain all options and up to 128K words of core or solid state memory in a single cabinet. A second cabinet can contain an additional 128K (max) words of memory.



**MODCOMP IV Organization**

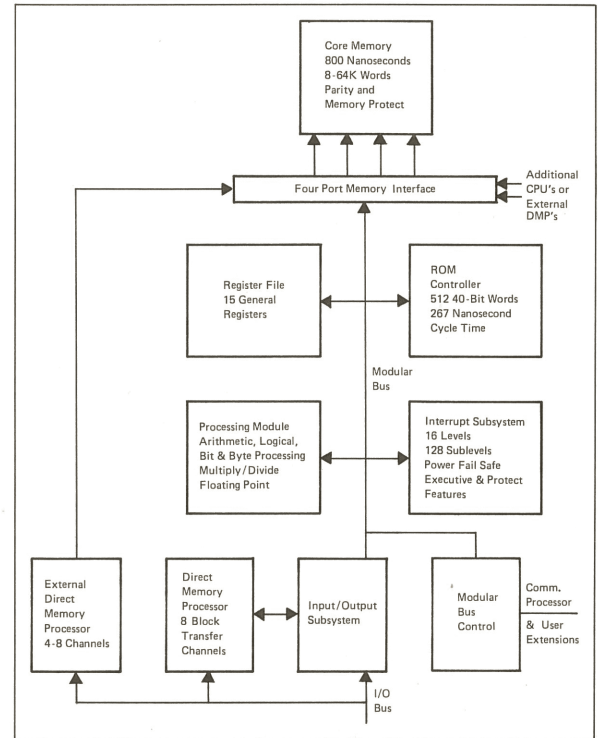


## MODCOMP II

This intermediate member of the Mod-Comp computer family is designed for efficient real-time system operation, particularly in applications that can take advantage of the software capabilities of the MAX III Real-Time Executive. The MODCOMP II offers all of the hardware features required by an advanced software system plus high speed integer and floating point arithmetic hardware, bit and byte manipulation, and a flexible I/O system. It is available in several different models which, collectively, offer:

- 16-Bit Word Length
- 800 Nanosecond Cycle Time
- 4 - 64K Words of Memory
- All Memory Directly Addressable

- Memory Parity
- Memory Protect
- Four Port Memory
- Power Fail Safe/Auto Start
- Hardware Fill
- Console Interrupt
- Panel Protect Keyswitch
- 15 General Purpose Registers
- Hardware Multiply/Divide
- Hardware Floating Point
- Bit, Byte, Word, Doubleword and File Manipulation
- 174 Instructions
- 16 Direct Memory Channels
- Real-Time Clock — 5 msec.
- 16 Priority Interrupt Levels
- 128 Interrupt Sublevels



MODCOMP II Organization



The MODCOMP II can contain up to 64K words of memory and all hardware options in the enclosure shown above.

## MODCOMP II Communications Processor

Take a MODCOMP II, add specialized communication macro instructions implemented by firmware, plus the ability to interface the Universal Communications Subsystem, and you have a ModComp II Communication Processor. In addition to the standard ModComp II features, the CP using special macros enables the user to maximize the efficiency of data stream processing. Typical of the macro capabilities are:

- Byte string move core to core
- Byte string character search and discard
- Automatic character replacement
- Byte string search for up to 8 program selectable characters with automatic subroutine exit upon detection
- Generation and accumulation of CRC<sub>12</sub>,

CRC<sub>16</sub>, and LRC with no additional cost in execution time.

- Pack or unpack a byte string as it is moved
- Translate a byte string as an option with any of the preceding at 800ns per character

Interfacing to the Universal Communications Subsystem adds the capability to multiplex data to and from up to 64 full duplex communications lines (per controller) directly to and from memory.

Data transfers may occur on a cycle stealing basis without program intervention (DMP). This subsystem interfaces to both synchronous and asynchronous lines.



# ModComp Software

The software available with ModComp computers is comparable in scope and capabilities to that previously available only with 32-bit computers. The wide range of operating systems, language processors and support software is illustrated in the table on the opposite page.

Much of this software, including the MAX II and MAX III operating systems, has been operating in the field since mid-1971 and has been field proven in hundreds of installations.

The new MODCOMP IV software is an extension and upgrading of the field proven MODCOMP II software. In addition to being more efficient, it is upward compatible.

The highlights of the Modular Application Executive (MAX) systems are listed below:

**MAX I** — This small, real-time operating system is used for controlling and scheduling the activation of core resident programs in a multiprogramming environment. It permits the user to develop a tailored application system in assembly language that controls, processes and/or acquires data. It operates in configurations having 4K or more words of memory.

**MAX II** — This disc operating system is used primarily in batch processing environments. It supports all of the ModComp language processors and support

software. It offers real-time extensions in that real-time, core-resident tasks can be added to the system and executed at a priority higher than that of the batch processing job stream. It operates in systems having 16K words or more.

**MAX III and MAX IV** — These task-oriented multiprogramming systems, support large real-time, batch processing and time-sharing applications both singly and in combinations. MAX IV is an extension of the capabilities of MAX III. It uses the multiple register files, memory mapping, hardware allocation/deallocation and other MODCOMP IV advancements to improve operating system performance as well as add new features.

The principal MAX III and MAX IV features are listed below. Those available only in MAX IV are so designated.

- An execution control routine called the Taskmaster multiplexes CPU time between up to 256 multi-program levels (tasks).
- Task programs can execute independently at unique software priority levels or at the same priority level on a cyclic basis.
- Tasks may be executed in either a privileged or unprivileged CPU mode.
- The context switching of the Taskmaster is caused by events such as the completion of a delayed service or

I/O operation, directly-connected interrupts, or another task.

- The operator communication task permits user-coded directives to be easily added.
- Tasks can be scheduled, started, suspended, resumed, or terminated by operator directives, timers, directly-connected interrupts, I/O handlers, or other tasks.
- Re-entrant executive services are available to all tasks. These include I/O operation queueing, execution control, byte-string syntax analysis, code conversion, and other utility services. Re-entrant and recursive executive services and subroutines may be developed by the user.
- The I/O system has handlers which support all standard ModComp peripheral devices — including special process I/O devices and communication multiplexers.
- I/O operations can be performed concurrently with task execution — or with the calling task suspended until the operation is complete.
- I/O devices are addressed indirectly via assignable files. Files may be private or global (public).
- All I/O operations that cannot be performed immediately are queued so that no program delay results due to a busy controller.





- Optional spooling tasks and symbionts may be used to buffer slow devices to/from disc files and to simulate special device characteristics.
- A real-time clock provides several types of timers for use by tasks. These include delay timers, task scheduling timers, watchdog timers, and CPU utilization counters.
- One or more tasks may be included for performing independent batch processing operations.
- The BASIC time sharing system can be included as a task.
- Input spooling is available as an option which permits a single job entry device to be used to schedule several parallel batch processing jobs concurrently.
- Output spooling is available as an option which permits any number of imaginary devices to be defined that use any number of physical output devices.
- The system loader, for user tasks, loads tasks and overlay segments from disc in an absolute format. The use of memory mapping by these tasks provides total hardware relocation and fast loading capabilities. (MAX IV only)
- The system core allocator is implemented with special hardware instructions which can allocate core pages quickly and efficiently. Any memory page can be put to use anywhere. No memory fragmentation problems exist because memory mapping allows contiguous core areas to be constructed from scattered core pages. (MAX IV only)
- Only a single core pool is required. Checkpointing of lower priority tasks (when higher priority tasks need core) needs to be instituted only when the very last memory page is exhausted from the core pool. (MAX IV only)

**MAXCOM** — This executive is designed to handle a wide range of communication system applications including message switching, line concentration and pre-processing. It provides:

- A low overhead program switching mechanism which enables high throughput rates to be achieved.
- A flexible set of services including input/output, timing, task activation, queue manipulation, memory management, and a variety of user support services and debug facilities.
- Standard physical device handlers.
- Computer-to-computer protocol.
- Operator directives for controlling both tasks and the physical resources of the system.

ModComp Software	MODCOMP		
	I	II	IV
<b>OPERATING SYSTEMS</b>			
MAX I Core Resident System	x	x	
MAX II Disc Operating System		x	x
MAX III Real-Time System		x	x
MAX IV Real-Time System			x
MAXCOM Communications Executive		x	
<b>LANGUAGE PROCESSORS</b>			
Assembler	x	x	
Macro Assembler		x	x
360/370 Cross Assembler	x	x	x
CDC 6000 Cross Assembler	x	x	x
Cross Assembler for MODCOMP I		x	x
Core Resident FORTRAN IV Compiler		x	x
Overlay FORTRAN IV Compiler		x	x
BASIC		x	x
RPG		x	x
<b>SUPPORT SOFTWARE</b>			
Disc File Management System		x	x
Utility Package — Dump, Copy, Debug, etc.	x	x	x
Source Update	x	x	x
Source Maintenance, Control, and Editor		x	x
Link Editor	x	x	x
Link Loader	x	x	x
Disc Cataloger		x	x
Math Library		x	x
Reentrant FORTRAN Run-Time Package		x	x
Plotting Package		x	x
Scientific Subroutine Library		x	x
<b>COMMUNICATIONS APPLICATION PACKAGES</b>			
IBM 2780 Emulator and Driver		x	x
CDC UT 200 Emulator		x	x
Univac 1004 Emulator and Driver		x	x
Bisync Communications		x	x
Remote Fill from Host CPU	x	x	
<b>MEASUREMENT AND CONTROL APPLICATION PACKAGES</b>			
Purdue Process Control Workshop			
Extensions to FORTRAN IV		x	x
Linear Programming		x	x
<b>COMMERCIAL APPLICATION PACKAGE</b>			
Commercial Subroutine Library		x	x
<b>DIAGNOSTICS FOR COMPUTERS, PERIPHERALS AND INTERFACES</b>			
	x	x	x

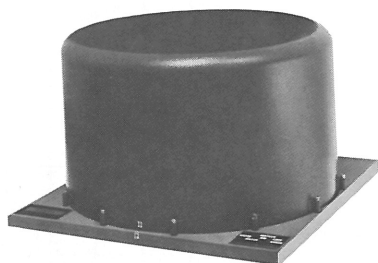




# Data Processing Peripherals

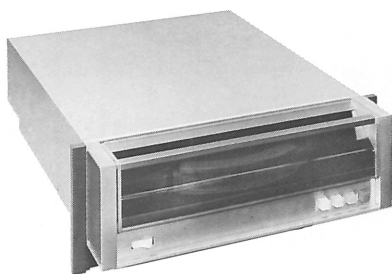
ModComp computers are available with a wide range of data processing peripherals, totally supported by ModComp software.

## Discs



### Fixed Head

8.7 Millisecond Average Access Time  
265K Words/Second Transfer Rate  
262K to 2M Word Capacity



### Moving Head Cartridge Disc

70 Milliseconds Average Head Position Time  
20 Milliseconds Average Latency Time  
97.8K Words/Sec Transfer Rate  
1,299,200 and 2,598,400 Words Capacity



### Moving Head Disc

35 Milliseconds Average Access Time  
12.5 Milliseconds Average Latency Time  
156K Words/Sec Transfer Rate  
12,312,320 and 24,624,640 Words Capacity

## Magnetic Tape Units



### 45 Inches Per Second

Industry Compatible  
9 Track, 800 BPI  
9 Track, 1600 BPI  
7 Track, 556/800 BPI

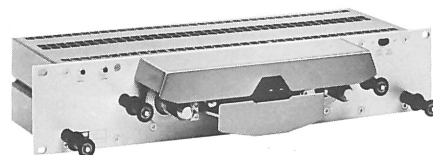
### 75 Inches Per Second

Industry Compatible  
9 Track, 800 BPI  
9 Track, 800/1600 BPI  
7 Track, 556/800 BPI

### 12.5 Inches Per Second

Industry Compatible  
9 Track, 800 BPI  
7 Track, 556/800 BPI

## Paper Tape



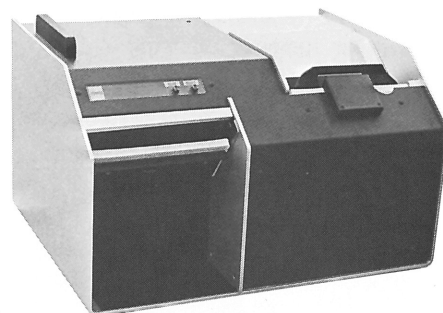
### Paper Tape Reader

625 Characters Per Second  
Photoelectric Sensing  
1-inch Wide, 8 Channel Tape

### Paper Tape Punch

110 Characters Per Second  
1-inch Wide, 8 Channel Tape

## Card Readers and Punches



### Cardreaders

#### 300 Cards Per Minute

600 Card Hopper  
600 Card Stacker  
12-Bit Binary or 8-bit Character Code

#### 1000 Cards Per Minute

1000 Card Hopper  
1000 Card Stacker  
12-Bit Binary or 8-Bit Character Code

### Cardpunch

#### 100 Cards Per Minute

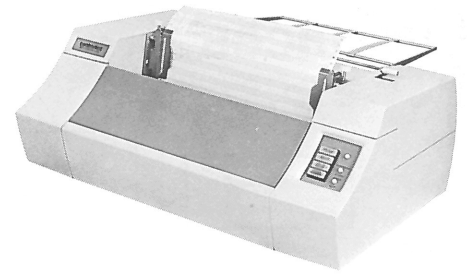
1200-1300 Card Hopper

### Keypunch/Cardpunch

35-60 Cards Per Minute



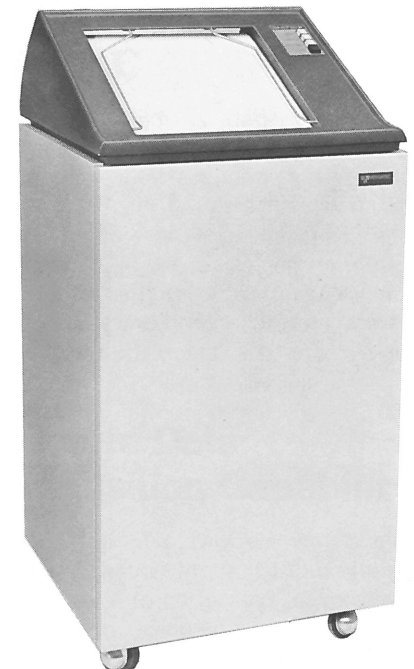
## Printers



50-150 Lines Per Minute  
132 Columns  
Line Buffer  
Vertical Format Control



300 and 600 Lines Per Minute  
132 Columns  
Line Buffer  
Vertical Format Control



500 Lines Per Minute  
132 Columns  
Electrostatic Printing and Plotting

## Terminals



### ASR-33

10 Characters Per Second  
Standard ASCII Code  
8-1/2-inch Wide, 72 Characters Per Line  
Printer  
1-inch Wide, 8 Channel Tape

### KSR-35

10 Characters Per Second  
Standard ASCII Code  
8-1/2-inch Wide, 72 Characters Per Line  
Printer  
1-inch Wide, 8 Channel Tape

### Data Communications Printer

#### Keyboard Send and Receive

30 Characters Per Second  
80 Columns  
Pin Feed Platen

#### Keyboard Send and Receive

120 Characters Per Second  
120 Columns  
External Forms Tractor



### CRT

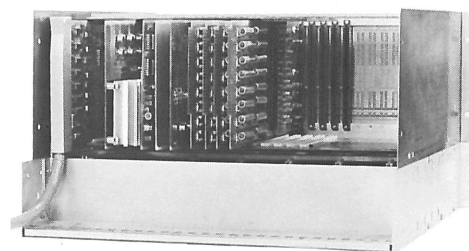
25 lines  
80 characters/line  
300-9600 baud  
Text editing





# Process Interfaces

ModComp process interfaces can handle almost any measurement or control job in plant, laboratory, or other facility. ModComp process interfaces are designed, manufactured, serviced and fully software supported by ModComp, resulting in total system capability from a single source.

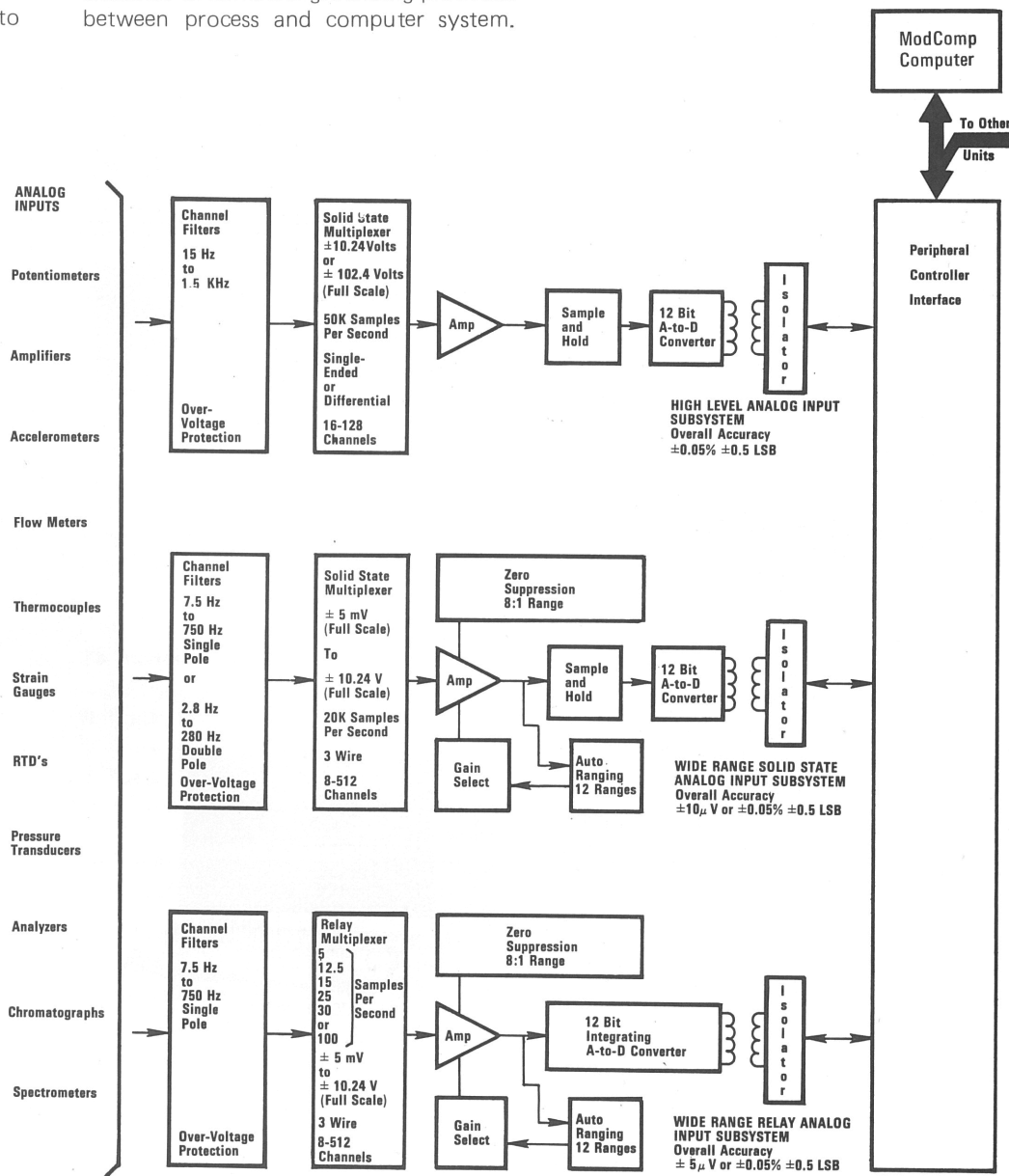


High Level Analog Input Subsystem showing enclosure with the MOSFET multiplexer gate cards and input filters on the right and power supplies in the bottom.

## Three Analog Input Subsystems

A choice of three analog input subsystems is available to handle a wide variety of signal levels and sampling rates. The High Level Analog Input Subsystem provides sampling rates up to 50K SPS for 10 volt or 100 volt full scale signals. The Wide Range Solid State Analog Input Subsystem offers 12 programmable gain ranges for full scale inputs from 5 millivolts to 10 volts. It offers automatic gain ranging and zero suppression to

produce resolutions up to 15 bits. The Wide Range Relay Analog Input System offers all of the features of the solid state subsystem, except the 20K SPS sampling rate and, in addition, it offers high common mode voltage capability. The standard unit can handle  $\pm 200$  volts peak, and an option for  $\pm 500$  volts peak is available. All subsystems provide d-c isolation to eliminate grounding problems between process and computer system.

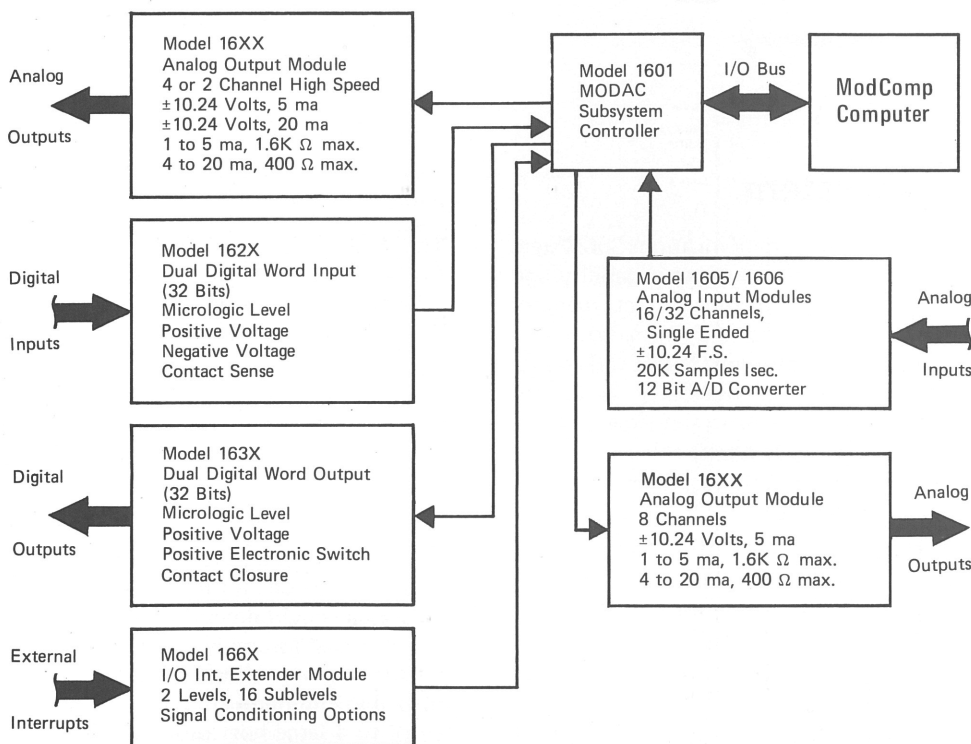
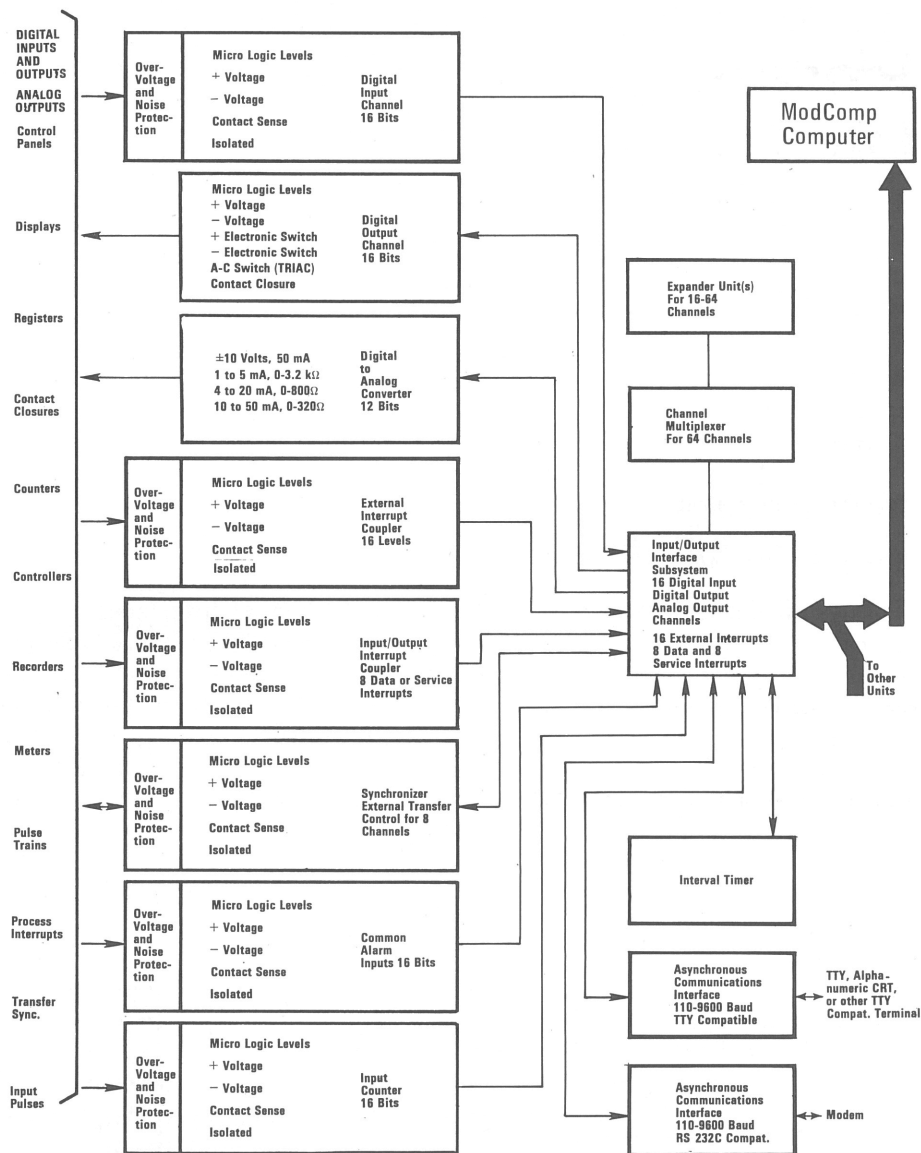




## Input/Output Interface Subsystems

This flexible unit can be connected to almost any combination of digital and contact inputs and outputs. It also handles analog outputs and line interfaces for asynchronous communication terminals such as CRT's, loggers, and typewriters.

The basic IOIS unit can contain up to 16 channels. Each channel can consist of 16 digital inputs or outputs, two analog outputs, or a communication terminal interface. Channel multiplexers are available which enable up to 64 subchannels, of 16 bits each, to be multiplexed at each of the 16 basic channel positions. Therefore, the total capacity meets virtually all system requirements.



## MODAC

This subsystem is designed for small requirements. It consists of a ModComp computer interface and one to seven modules in an 8-3/4 inch high package. Each module provides 16 or 32 analog inputs; 2, 4 or 8 analog outputs; or 32 digital inputs or outputs. A variety of signal conditioning options are available for both digital and analog signals.

## Remote Data Acquisition Capability

A serial link is available which enables MODAC and Input Output Interface Subsystems to be located up to one mile from a ModComp computer. The remote controller can be contained in the MODAC unit. Coaxial cables, not requiring modems, are used for the communication lines. Communication rates up to 16K words per second are achieved.



# Communications

## Multiplexers and Line Interfaces

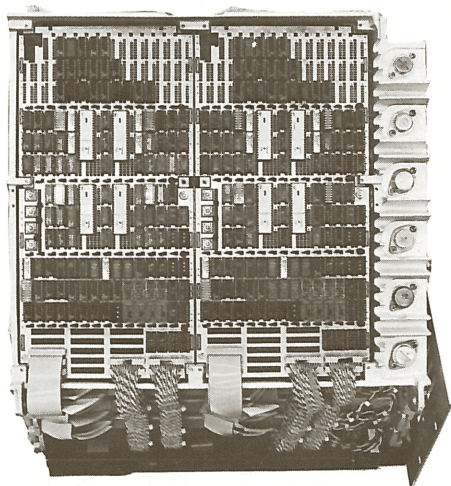
### Communications Interfaces

ModComp offers a comprehensive line of communications interfaces, available as single and dual channel controllers for systems requiring a minimum number of lines. Multiline controllers are available for applications requiring a larger number of synchronous and/or asynchronous lines.

### Computer to Computer Link

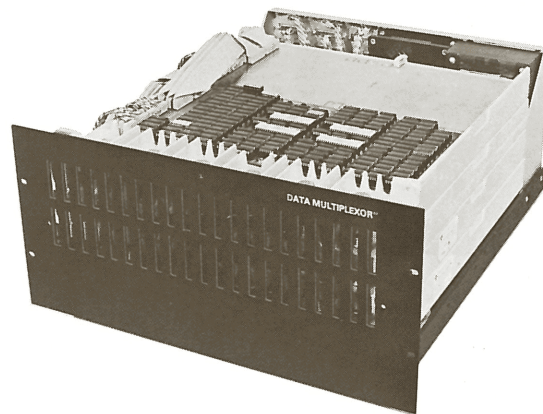
ModComp offers a computer to computer link, although not purely a communications line interface, that provides direct byte parallel inter-processor communications at speeds of 200K bytes/second. Operating under DMP control, the CPU link provides the vehicle for high speed inter-computer communications in a wide variety of real-time applications.

## Universal Communications Subsystem



The Universal Communications Subsystem offers the highest throughput capability and flexibility by providing direct memory (block) transfer to and from both synchronous and asynchronous communication lines. The flexibility is further enhanced by the programmable features of the subsystem which include:

- Dynamically Selected Special Character Detection
- Dynamically Selectable Baud Rates
- Variable Frame Size
- Variable Character Parity
- Asynchronous Rates to 20 Kilo Baud
- Synchronous Rates to 250 Kilo Baud
- 4 to 64 Full or Half Duplex Lines per Controller



### Dual Channel Interfaces

Dual channel interfaces are available for both synchronous and asynchronous modes of transmission. Each dual channel interface provides two full duplex line interfaces, mounted in a standard ModComp peripheral controller interface. Major line protocol characteristics are modifiable via program commands thereby increasing the utility of the channel interfaces. Standard features include:

- 75-9600 Baud
- 5, 6, 7, 8 Bit Frame Size
- 1 and 2 Stop Bits
- Character Parity Generation and Checking
- Double Character Buffering
- RS232 and/or Current Loop Interfaces

### Remote Fill

ModComp also offers single channel controllers, for use in remotely connected processors, which provide the ability to detect and initiate a program load from a host processor.

### Asynchronous Communications Subsystem

The asynchronous subsystem provides a cost effective means of interfacing a large number of low to medium speed asynchronous lines. This subsystem provides for control of up to 128 half or full duplex lines. Standard features include:

- 2-128 Lines per Controller
- 75-9600 Baud
- Multiple Line Speeds per Controller
- Auto Answer Standard
- RS232 and Current Loop Interfaces

The high throughput achievable with the Universal and its flexibility make it ideally suited for front-end and large message switching applications.

## Remote Batch System

ModComp offers standard batch terminal emulator systems for IBM, CDC, and Univac central processors. All emulators are designed and implemented with the capability to be run as a single task in a multitask environment. This capability enables local assembles, FORTRAN compilations, and real-time task executions to occur simultaneously with remote job entry to a large host processor.



## Applications

### Universal Communications Subsystem

Primarily used in dedicated communications applications, the Universal Communication Subsystem offers the flexibility to implement the classical communications applications:

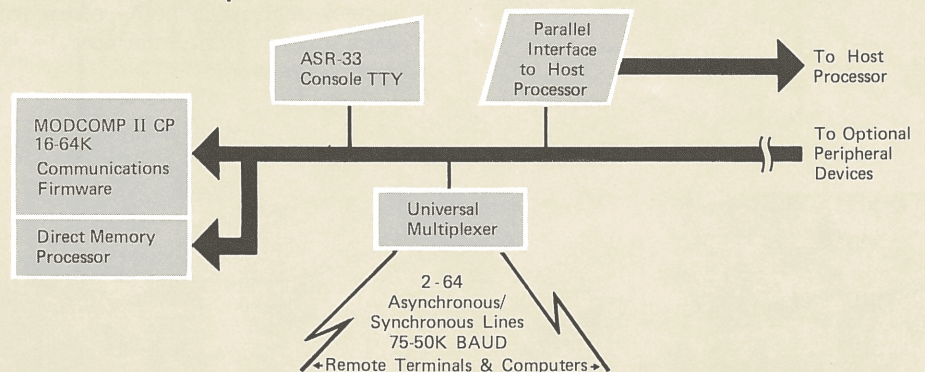
- Front End Processing
- Message Switching
- Remote Concentration
- On-Line Inquiry

The ability to mix line speeds and protocols, frame sizes and parity offer the basis to simultaneously interface a wide variety of terminals and line types, facilitating the implementation of any application. Operating through the Direct Memory Processor provides high data thrupt capability, further augmenting the power of this subsystem. The Universal Communications Subsystem may also be used in a non-dedicated communication system when high thrupt rates are required.

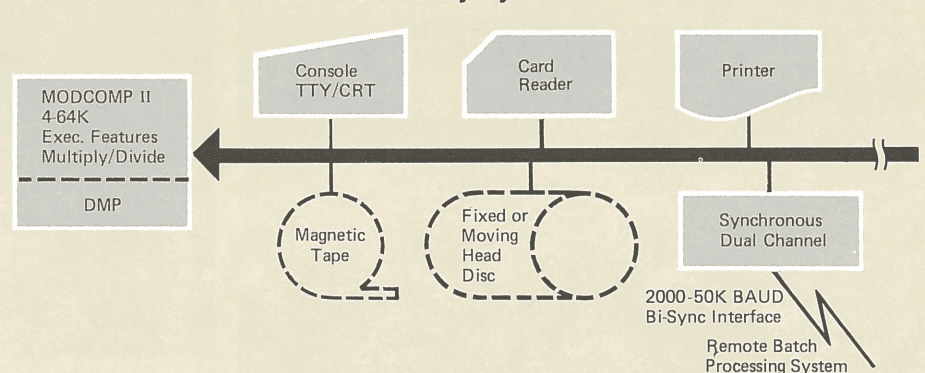
### Line Interfaces and Multiplexers

The communications line interfaces described are designed for use in systems in which the communications function is secondary to other real time applications. The dual channel interfaces, single channel interface with remote fill and computer to computer link are typically installed in remote station configurations, high speed link to a host processor, and CPU communications in dual or multiprocessor systems. The Asynchronous Communications Subsystem is used for terminating a large number of low-medium speed lines where extremely high data thrupt rates are not required. Remote concentration on a teletype network or message switching as an adjunct to other functions are two application areas where the Asynchronous Communication Subsystem provides an economical solution.

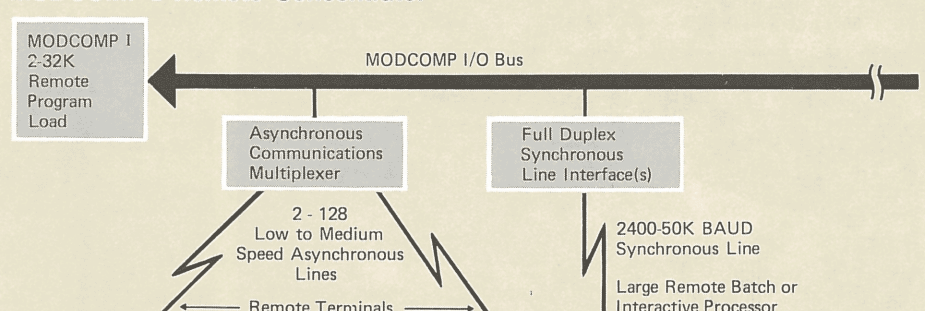
#### MODCOMP II Preprocessor



#### MODCOMP II Remote Batch/Job Entry System



#### MODCOMP I Remote Concentrator





# ModComp Support

ModComp provides local support to customers from our sales and service centers listed on the opposite page. Training and field support back-up are provided at our main facilities, shown below.

## ModComp Support Consists of:

### ■ Training

Almost 20 different hardware and software courses are offered at regular intervals. The three-week MODCOMP II programming courses are conducted at 3-4 week intervals.

### ■ Software Support

In addition to field support by our system analysts, a home office software support group interfaces directly with customers.

### ■ System Analysts

Technical support in hardware and software system design, installation planning, and system operation is provided by our regional system analysts.

### ■ Field Service

Local customer service engineers install new systems, provide warranty service, and offer a variety of service contracts ranging from emergency calls to full service.





## ModComp Sales Offices

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Boston . . . . . (617) 890-4044  
Chicago . . . . . (312) 833-5620  
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Denver . . . . . (303) 758-8833  
Detroit . . . . . (313) 689-1188  
Fort Lauderdale . . . . . (305) 974-1380  
Indianapolis . . . . . (317) 259-1243  
Los Angeles . . . . . (213) 986-3590  
New York . . . . . (201) 583-5444  
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San Jose . . . . . (408) 247-4152  
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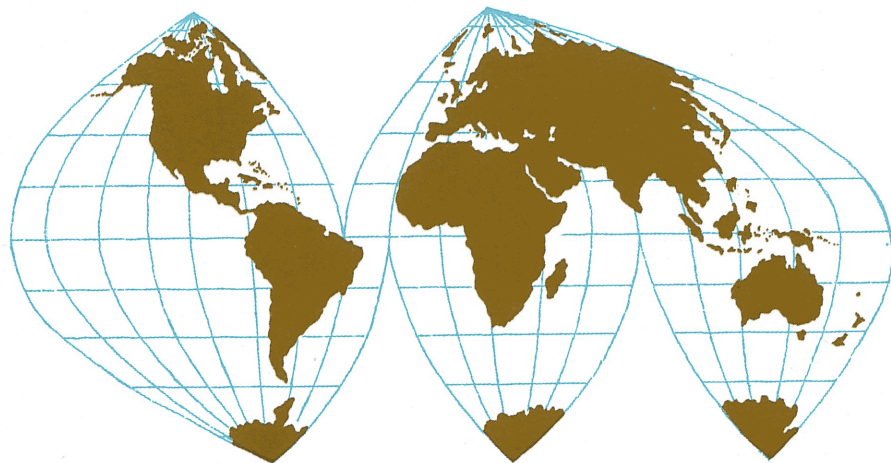
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## ModComp Service Centers

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Chicago  
Cleveland  
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